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## Article

# The Energy Transition: Democracy, Justice and Good Regulation of the Heat Market

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**Abstract:** This paper discusses whether the concepts of energy democracy, energy justice and the principles of good market regulation could play a role in developing a more consistent approach towards the regulation of the energy sector. It is concluded that the principles of good regulation can provide a useful framework within which advantages and disadvantages can be weighed of regulatory choices to be made when modernizing the regulation of the energy markets. A case study of the Dutch heat market is used as an example, showing that a lot remains to be gained in terms of flexible regulation and supervision and the facilitation of citizen participation. Both energy democracy and energy justice call for this. The lack of flexibility in the current regulatory framework could lead to ineffective and disproportionate regulation, hindering a sustainable, reliable and affordable development of the heat market. A larger need for flexibility is justified because of the differences between the types of heat networks. Customized solutions regarding unbundling and third-party access, including the modernization of the heat market, also require sufficient discretionary powers for the independent regulator that do not hinder but in fact stimulate the development of the heat market. Furthermore, increased citizen-participation is important in light of energy justice and energy democracy, which are energy specific concepts that overarch the principles of good regulation in the energy sector. Both concepts are based on the awareness that the energy transition is a matter for all citizens of the European Union and should not be ignored by policymakers and independent regulators. Since it is likely that most heat consumers will remain locked in for a relatively long time in natural monopolies facilitated by older generation heat networks and a lack of alternatives, substantive citizen-participation could yield positive results regarding community engagement in heat network management and heat supply.

**Keywords:** heat market; economic regulation; good governance; regulatory disconnect; energy transition; energy justice and energy democracy

## 1. Introduction

As testified by the European Commission's ambitious European Green Deal [1], the energy transition plays a pivotal role in policy decisions mitigating climate change [2]. Energy generated with sustainable sources and new ways of storing energy are being stimulated. Hydrogen, for example, gains momentum as an energy vector because it can be extracted not only from fossil fuels but also, more sustainably, from biomass (gasification) and water (electrolysis) [3]. Due to its versatility, hydrogen can be used to store electrical power, which is an important function with the impending 'greenification' of the energy sector. The use of renewable energy sources, such as wind and solar energy, may lead to situations in which too much or too little energy is generated, depending on the availability of the energy source. Hydrogen can act as a buffer to safeguard a constant flow of energy. In addition to the use of hydrogen, there are numerous examples showing that the energy transition stimulates new

ways of generating and storing energy. One important consequence of these developments is that the different subsegments of the energy industry increasingly interact [4].

In spite of the on-going changes in the energy sector, the legislative framework and legal safeguards currently in place are still largely based on the traditional market model, in which centrally managed, fossil fuel-based and large-scale production units supply energy to meet user demand. Regulation is still based on the idea that energy markets are separate ‘silos’. Interaction between different energy markets is not yet accounted for. With the rise of new ways of generating and storing energy, a discrepancy can be identified between technological and legal developments in the energy sector and the traditional market model related assumptions of the existing regulatory framework. This can be seen as an example of regulatory disconnection that needs to be restored [2,5]. To spur the energy transition in the Member States, the European Union has adopted the Clean Energy Package to facilitate the integration of renewable energy in the electricity system. The European Commission is also preparing plans to amend the European directives and regulations regulating the gas market [6]. Besides pointing out a need for improved regulation for the ‘traditional’ energy markets, the energy transition also raises questions on the regulation of previously lesser-regulated and new territories in the energy sector, such as the hydrogen market and the heat market.

Considering the increasing interdependencies between different energy markets and the ‘silo approach’ of regulating them, a fundamental question arises whether the principles of good regulation could play a role in developing a more consistent approach towards the regulation of the energy sector [7]. The purpose and central question of this contribution is, therefore, to assess whether the principles of good regulation can play a role in achieving a consistent and systematic approach to the regulation of the energy sector as a whole, and if so, how these principles can be interpreted and applied. In this regard it is also important to consider whether the principles can help to formulate regulation in a less path dependent way. Instead of focusing on regulating traditional technologies like electricity or gas related technologies, this would mean that regulation focuses on specific market characteristics or phenomena to protect certain public values, such as sustainability and freedom of choice [8].

The principles of good regulation provide a framework for the legislature, the government and for the administrative authorities for economic market design [9]. ‘Traditional’ energy market regulation testifies to this: well-known principles of good regulation, such as the principle of independence, are implemented in the European regulation of the electricity and gas markets. However, since the energy transition stimulates interdependency between the different energy markets of the energy sector, a smooth connection between all energy markets is desirable. This is not yet accounted for: regulation of the ‘less traditional’ markets may differ substantially from the (harmonized) regulation of the ‘traditional’ energy markets. Due to absence of any EU harmonization, regulation and integration of the different markets comprising the energy sectors are a challenge.

This article will underline the importance of the principles of good regulation for all energy markets, in particular in light of their increasing interconnectedness due to the energy transition. The article contributes to ongoing research by linking energy justice and energy democracy to the principles of good regulation in the energy sector. Previous studies have explored the essence and the role of energy justice and energy democracy for the energy transition [10]. The role of the principles of good regulation for economic market regulation has also been established by several studies [9]. The article will link these findings by addressing how energy justice and energy democracy affect the application of the principles of good regulation in the energy sector. It can be concluded that the energy transition stirs up the debate on the importance of energy justice and energy democracy and that under the influence of the concepts of energy justice and energy democracy, the principles of good regulation may even evolve into an energy-specific set of principles.

These findings are relevant because the energy sector is in a crucial phase in which (sometimes costly) decisions have to be taken that will define how the energy sector as a whole will function to facilitate and realize the energy transition. In order to create a more coherent approach to the

regulation of the energy sector, the principles of good regulation provide a framework of norms and may offer guidance as to how to approach basic design questions of drafting or redrafting future-proof energy laws.

The article will examine the Dutch heat market as a case study and a proxy for other parts of the energy sector. The Dutch heat market is the ideal candidate for a more detailed study as a new regulatory set-up is envisaged as of 1 January 2022 in the Netherlands. On 28 June 2019, the Dutch government presented a national Climate Agreement that shows the way to reducing greenhouse gases by 49% in 2030 in the Netherlands, compared to the levels in 1990 [11]. One of the identified solutions to reduce CO<sub>2</sub> emissions is the expansion of the heat market as it is seen as a more environmentally friendly alternative for heating homes compared to natural gas.

While heat networks are thus gaining more importance in the Netherlands, so is the discussion regarding the appropriate market organization and adequate regulation of the heat market and the entire energy sector in transition. A discrepancy between existing legislation and developments regarding the energy transition is also identifiable in the Dutch heat market, where old-fashioned assumptions still underlie the existing regulatory design. For instance, one such assumption is that natural gas is the standard heat source. For that reason, the maximum price for heat is based on the no-more-than-otherwise principle, (*niet meer dan anders principe*). This principle entails that the maximum price that consumers pay for heat is based on the (average) price of natural gas.

The article will firstly introduce the concepts of energy justice, energy democracy and the principles of good regulation. It will provide an overview of state-of-the-art literature on these concepts and their interaction. Subsequently, the Dutch heat market is explored. Following this, the main developments taking place in the Dutch heat market will be considered. This will allow us to identify the main economic and legal challenges, which will be assessed in the subsequent section. Lastly, the research question will be answered as to how the principles of good regulation can play a role in decision-making regarding the design of market organization, regulation and supervision in a way that restores the regulatory disconnect in the heat market and provides for a more coherent approach towards energy regulation.

## 2. Role and Function of Energy Justice, Energy Democracy and the Principles of Good Regulation

The European energy sector is based on several public values that include affordable, sustainable and reliable energy for all European citizens [12]. These public values are partly reflected in the concepts of energy justice and energy democracy, and the importance of these two core concepts is increasingly being recognized for the regulation and market organization of the energy sector [13]. Whereas these public values must be taken into consideration within the context of decision-making, they can also be in conflict with each other (energy trilemma) [14].

Energy justice aims at a fair distribution of energy, starting by questioning “the ways in which benefits and ills are distributed, remediated and victims are recognized” [15]. (Jenkins et al. 2016). Energy democracy, on the other hand, is aimed at the involvement of citizens in the energy sector as ‘energy citizens’ [16]. For the energy transition, this implies that costs and benefits are distributed evenly amongst energy citizens. As such, energy justice and energy democracy go hand-in-hand and reveal that energy democracy and energy justice can be considered an energy-specific translation of the democracy principle and the rule of law. The democracy principle and the rule of law are foundations of the European Union, based on fundamental national values. The democracy principle entails that EU action is legitimate while the rule of law serves a just society.

In addition, as these sector-specific concepts are getting a stronger foothold in the shaping of the European energy sector, they have also started to pervade the principles of good regulation in the energy sector [17]. The principles of good governance (also referred to as principles of good regulation) first took the main stage in the World Bank’s policy statements. Lewis T. Preston, the then-president of the World Bank, stated that “[e]fficient and accountable management by the public sector and a predictable and transparent policy framework are critical to the efficiency of markets and governments,

and hence to economic development” [18]. It is safe to say that, today, accountability and transparency are still the basis for good governance. In addition, other principles are recognized for their roles in shaping regulation and governance.

Some of the principles have been acknowledged explicitly in European case law and currently play a large role at both a European and national level [19]. The principles of good regulation provide a basis for legislation and regulation in the energy sector and other network sectors [9]. Although differently colored according to the relevant situation, the principles provide a core of ‘normative, universal values’ [20], which are generally reflected in legislation and practice as norms that are guaranteed. As such, several principles of good governance are embedded in European energy policies and give expression to normative values of democracy and the rule of law. This way, the principles of good regulation in the energy sector act as specific interpretations of energy justice and energy democracy.

In the absence of European regulation for the entire energy sector, it is worth looking into whether the principles of good regulation, by expressing the values of energy democracy and energy justice, can facilitate a holistic approach towards regulating the energy sector in transition. This will provide an opportunity to assess where and how the principles of good regulation can play a role in restoring the growing regulatory disconnection between theory and practice in the Dutch heat market. The principles are solely discussed with an eye on the requirements for the organization of the market design and the economic regulation of the heat market. Therefore, certain meanings and sub-principles are omitted. We will, for example, not go into the actual design of the accountability mechanisms of regulators and the coordination amongst national, regional and local levels [21–23].

### *2.1. The Principles of Good Governance, Energy Democracy and Energy Justice*

Aimed at tackling disparities in our energy system, energy justice refers to the decision-making process for energy projects and the need to reach fair and just outcomes [10,24,25]. The concept of energy justice “seeks to apply justice principles to energy policy, energy production and systems, energy consumption, energy activism, energy security and climate change” [15,26] (Jenkins et al. 2016). Thus, energy justice also questions the existing state of affairs in the energy sector and plays a role in formulating what should happen from a perspective of what would be ‘just’ [13]. This reveals that (striving for) equality as a principle of the rule of law is at its root [27]. The universality of energy justice means that studies on energy justice are typically concerned with three fundamental forms of justice: distributive justice—who gets what? procedural justice—who is involved in the decision-making? and justice as recognition—who is ignored or misrepresented in the energy system? [28,29]

Energy democracy focuses on collective, substantive participation of citizens in energy projects (cf. the citizen energy community as referred to in the recast Energy Directive) [16,30]. Energy democracy is aimed at reforming the current organization and decision-making process in the energy sector by advocating reform, showing a link with the principle of democracy. As such, energy democracy also forms the counterpart of energy justice: both are needed for a democratic and just energy transition. Instead of a top-down approach, energy policies should be as much bottom-up as possible in that policies take into account and are shaped by views of citizens, have the flexibility to respond to their current and changing needs and are suited to facilitate consumer ownership [31]. The often necessarily decentralized nature of many renewable energy sources fits in well with the aims of the energy democracy concept. Smaller scale projects leave more room for citizen initiatives and participation and encourage community engagement and innovation [32].

Originally, the principles of good regulation are more procedural of nature, impacting the quality of the decision-making of the regulatory choices that have to be made to modernize the energy sector [14]. However, they may develop to include more substantive aspects, such as safeguarding an equal distribution of costs and benefits. Such development may take place under the influence of energy justice and energy democracy since they are dual in nature by being both procedural and substantive. Thus, they not only relate to whether a certain practice is democratic or just (substantive) but also as to how to attain a democratic or just outcome (procedural). Energy democracy and energy

justice function as overarching concepts in the energy sector that offer leads to policy-makers (and independent regulators) on how to pursue the goals—or public values [33]—of the energy sector.

Considering the growing awareness that energy justice and energy democracy may have a big impact on shaping the energy transition, the principles of good regulation, as applied in the energy sector, are increasingly influenced by these energy-specific core concepts. The principles can be expected to evolve into a separate set, applicable only to the energy sector, expressing energy justice and energy democracy. In light of the moral connotations of energy justice and energy democracy, the principles of good regulation in the energy sector may be expanded upon by adding several principles that are traditionally not considered part of the general principles of good regulation. In particular, the polluter-pays and precautionary principles come to mind. To mitigate climate change and to prevent the reoccurrence of past instances in which societies suffer from externalities of the use non-renewable energy sources, the polluter-pays principle encompasses the obligation for polluters to bear the costs of pollution-prevention and control measures [34]. Following naturally from the need to diminish pollution endangering the climate, the precautionary principle enables regulators to adopt protective measures when scientific evidence about an environmental or human health hazard is uncertain and the stakes are high [35].

It should be remarked that the principles of good regulation do not provide absolute (black-and-white) answers. Instead, the principles—discussed hereafter—provide guidance as to which different interests should be balanced in decision-making and how to reconcile or respond to conflicting interests. They indicate which direction to take in the design of legislation and institutions. The link between the concepts of energy democracy and energy justice and the principles of good regulation are illustrated in Figure 1.



**Figure 1.** Umbrella function of energy justice and energy democracy.

## 2.2. Independence

The first principle of regulation to be discussed is the principle of independence of the national regulatory authority.

In early case law, the Court of Justice of the European Union stated that the national regulatory authority in charge of the application of economic regulation needs to be independent from market parties [36,37]. To fully prevent regulatory capture, independence from all market parties, public and private, must be required [38]. In light of Article 4(3) TEU, this is needed to ensure an effective application of EU (competition) law [37,39]. In order to guarantee fair competition, the principle entails that a regulatory authority should be independent from all market parties [40]. This can partially be guaranteed by the law itself if the responsible regulatory authority provides conditions and restrictions for its application. However, laws have to be sufficiently flexible to adjust to changing economic, environmental and social circumstances. This can be ensured by attributing a regulatory authority with a sufficient degree of discretion to act within the regulatory framework [9].



A second aspect of independence—political independence—is not (yet) as firmly established [9]. Political independence refers to “the degree to which [an] agency takes day-to-day decisions without the interference of politicians in terms of the offering of inducement or threats and/or the consideration of political preferences” [41] (Hanretty and Koop 2018). The Organisation for Economic Co-operation and Development (OECD) has found that regulators are required to be politically independent as this results in public confidence in the objectivity and impartiality of their decisions and effective operation, thereby increasing the trust-levels in the market [42,43].

Applied to the energy sector, political policy choices the government should make include general decisions concerning the affordability and availability of energy. To realize these policy objectives, an independent regulatory authority must take (day-to-day) regulatory decisions independently and use different instruments autonomously, including the establishment of the methods of tariff regulation [44]. With regard to the ‘traditional’ energy markets, independence of the relevant regulatory authorities has increased over the years [45]. Due to the lack of European harmonization, similar identifiable standards of independence are not in force throughout the energy sector. Whilst the principle of independence is a fundamental principle of European and often also national law, a lack of specific independence requirements can be a weakness in light of, for example, state-ownership in newly instated sustainable energy projects that link multiple energy markets [46].

### 2.3. Accountability

While the independence principle is indispensable to guarantee objective and consistent decision-making, there is a danger that independence will lead to a regulatory authority acting beyond its mandate [47]. In order to curb this risk, a well-functioning accountability mechanism is required. Accountability and independence are, therefore, two sides of the same coin, demonstrating a constant tension between them [47]. Increased control and accountability regarding regulatory authorities legitimizes decisions taken by independent regulatory authorities and safeguards that authorities’ actions do not go beyond what is necessary [48].

Bovens defines accountability as “a relationship between an actor and a forum, in which the actor has an obligation to explain and to justify his or her conduct, the forum can pose questions and pass judgment, and the actor may face consequences” [49] (Bovens 2007). This practical definition focuses on the process of giving account. In the organization of economic regulation of the energy market, accountability should, in the first place, be directed towards the government [40]. This is referred to as political accountability and entails that an economic regulator renders account to a representative body [50]. Secondly, a regulatory authority also needs to give account to its stakeholders in a more direct way. Stakeholders, for example, include heat consumers, consumer organizations, lobby groups, NGOs, etc. [51]. Such social accountability is likely to increase support for the activities of the regulatory authority [52]. In that regard, stakeholders might discover incidents in which their interests have insufficiently been taken into account by the regulator, or the regulator has followed the wrong procedure according to a stakeholder, etc. [53]. As a consequence, social accountability, coupled with legal standing rights, gives stakeholders the chance to refer matters to the judiciary as an extra control mechanism [54].

### 2.4. Transparency

The principle of transparency flows from the principle of democracy [55,56] and pursues two different aims in the context of economic regulation. Firstly, it provides for legitimacy of a regulatory authority’s independence [55] and, secondly, the principle of transparency contributes to the effectiveness [57] of economic regulation.

The definition given by Hancher, Larouche and Lavrijssen thoroughly denotes the requirements imposed by this principle upon economic regulators: regulatory authorities need to be open to stakeholders about their objectives, processes, records and decisions. Moreover, authorities should explain to their citizens and the regulated firms the rationales of their decisions. Given that authorities

are liable to be ‘captured’ by regulated firms, the principle of transparency could even go as far as to require authorities to actively seek the involvement of other interests, in particular customers and citizens, in their activities [9].

Transparency also obligates regulatory authorities to duly motivate and publish their decisions [58]. In line with this obligation, regulation itself should be accessible and comprehensible for the benefit of both regulated and affected parties. The accessibility of regulation increases legal certainty and thereby opens the way for social accountability. It gives parties the possibility to verify whether a regulatory authority acts within its legal mandate, and it provides legal certainty to market parties [58]. This legal certainty lies in the possibility to check any action of a regulatory authority against its legal obligations and powers that it derived from the law.

Legal certainty in terms of having access to (clear) regulation could be particularly beneficial for the energy sector as a whole, taking into consideration that significant (infrastructure) investments have to be made to facilitate the energy transition. It allows for firms and potential investors to take informed decisions as to their involvement in the energy transition, facilitating a good investment climate, which is necessary for realizing the energy transition.

### 2.5. Participation

From the definition of the principle of transparency, a transition to the principle of participation is easily made. Participation of all stakeholders is essential for the benefit of economic regulation. Stakeholders include heat consumers, energy consumers, consumer organizations, lobby groups, NGOs, etc. [51].

According to the European Commission, improved participation is likely to create more confidence in the end result [19]. Traditionally, the principle of participation was aimed at safeguarding procedural rights of stakeholders. In the context of the energy transition, this principle gains more substantive significance. Therefore, participation is likely to go beyond merely improving awareness or increased legitimacy of regulation in the energy sector: it can play a role in fostering innovation by giving citizens a meaningful voice in how to shape the energy transition, thereby implementing aspects of energy justice and energy democracy.

A further development influenced by energy justice and energy democracy is that a distinction could be made by type of participation: procedural participation versus substantive participation. Procedural participation is best described as the (more traditional) right of stakeholders to be consulted at set points, such as a public consultation on a draft regulation. Substantive participation, on the other hand, refers to an on-going process of participation by stakeholders, a constant and direct influence on the governance of energy projects. Here, citizen participation (and of other stakeholders) goes beyond a formal tick-the-box exercise. It shows that the concepts of energy democracy and energy justice are being fleshed out from a legal viewpoint. This trend is reflected in the increased attention on substantive participation in European regulation, which refers to the role of the citizen energy community and the concept of active consumers. The recast Energy Directives refer to the benefits of citizen participation, implementing values stemming from the concept of energy democracy, and energy justice. Benefits range from higher acceptance rates of the energy transition by citizens, access to private capital from individual or groups of citizens and participation in the development of innovative energy projects initiated by citizens.

### 2.6. Effectiveness

The Commission states that the principle of effectiveness as a principle of good regulation entails that “[p]olicies must be effective and timely, delivering what is needed on the basis of clear objectives, an evaluation of future impact and, where available, of past experiences. Effectiveness also depends on implementing EU policies in a proportionate manner and on taking decisions at the most appropriate level” [19] (European Commission 2001). This definition shows that the principle of effectiveness reflects a commitment (there is not one ‘effective outcome’ to the exclusion of other outcomes). This



commitment is subject to the binding nature of the elements relating to the principles of subsidiarity and proportionality that apply to all EU actions—in line with Article 5 TEU. Subsidiarity signifies that decisions must be taken at the lowest appropriate level, whereas proportionality guarantees that measures are not unnecessarily invasive. Whether these principles are adhered to can in most cases be ascertained, giving a verifiable edge to what is effective. Effectiveness should act as an obligation resting upon both legislator and regulator when drafting legislation and policies and taking decisions, taking into account the principles of subsidiarity and proportionality [59,60].

Effective regulation assists in preventing and solving instances of regulatory disconnect if it offers flexibility to the regulatory authority. Flexible regulation allows for the regulatory authority to regulate the energy sector as a whole, rather than as separate ‘silos’. In addition, flexibility allows for less path dependency in terms of favoring existing technologies and opens the way for newer innovative technologies. As the energy transition requires increased interconnectedness within the energy markets, a certain level of flexibility in regulation may prove beneficial in attaining the necessary links in the markets. Taking the principle of effectiveness into account in market design, thus, facilitates the evolution of the different energy markets in a coordinated way and safeguards the efficacy of the energy sector as a whole.

### 2.7. Efficiency

Effectiveness implies a need for efficiency, bringing us to the principle of efficiency [61].

For the governance of the energy sector, the principle of efficiency bears most relevance when it concerns looking at a market as a whole. The central aim of efficiency is then to ensure an effective relationship between the results of regulation and regulatory action and the costs needed to achieve these results [62]. In order to guarantee a market that operates efficiently, intervention should only take place when a market does not operate efficiently. Only a market failure, i.e., monopoly, information asymmetry, externalities, etc., justifies intervention, and only in so far as it remedies the perceived market failure [63]. In addition to these economic grounds, a market failure in the energy sector may come in the form of public values that will not be adhered to when left to the ‘free market’. The definition of an efficient European energy sector includes certain values that society wants to safeguard. These non-market values are equally also relevant in deciding whether intervention is necessary [64]. For the energy sector to be efficient, it can thus be argued that the classic efficient market curve (see Figure 2 below) incorporates the values of the energy sector: reliable, affordable, sustainable energy for all European citizens.

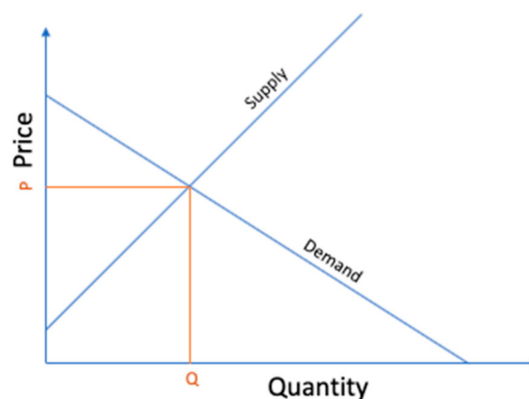


Figure 2. Efficient market curve.

The relevance of the principle of efficiency is highlighted by the many changes instigated by the energy transition. For regulatory authorities to be able to keep up to speed with innovations and developments taking place in the energy sector and prevent them from causing hindrances, efficient, flexible, regulation and action is key [65].

### 3. Characteristics of the Dutch Heat Market

The principles of good regulation provide a framework for a coherent regulatory approach for the entire energy sector. European regulation of the ‘traditional’ energy markets already partly takes place within this framework and embeds the principles of regulation. However, currently, regulatory frameworks are regulating specific technologies and are lagging behind technological developments. The energy transition requires approximation and review of existing legislation in the energy sector. The principles of good regulation should also apply to decide if and how to approach the regulation of ‘newer’ markets, pertaining to renewable energy sources and sustainable energy storage, such as hydropower, biofuels, hydrogen, etc. Since these markets are becoming more interlinked, the need for a coherent regulatory approach is increasing. Examples that could benefit from such a coherent approach are tariff regulations, as, at the moment, the active role of prosumers throughout the energy sector is not taken into account in pricing policies [12]. In addition, transport tariff regulation consistently only takes into account investments that a company makes in the specific technology needed to transport the regulated type of energy (replacement costs). Investments in technology in neighboring markets that could also influence the transport prices are left aside [66]. In light of the increasingly interlinked energy markets, this could be ineffective. For example, investments in hydrogen could lower the actual costs of electricity and, thus, attain optimizations not directly targeted by electricity tariff regulation. This example underlines the importance of a comprehensive regulatory approach towards the energy sector.

The relevance of the principles of good regulation in the energy sector on attaining a comprehensive regulatory approach will be assessed below on the basis of the Dutch heat market. This market is suited for such a study as it is gaining importance in the transitioning to a carbon-neutral economy due to the possibilities it offers for the incorporation of renewable and more sustainable energy sources and the storage of energy generated from renewable energy sources [67].

#### 3.1. Heat Networks

For the purposes of this article, a heat consumer is defined as a household, i.e., a small consumer, connected to a heat network with a maximum of 100 kilowatts. This market currently covers between half a million to a million heat consumers in the Netherlands [68–70].

In the Netherlands, most heat networks are privately owned by companies and heat is supplied by a vertically integrated heat supplier. In 2015, 40% of all heat consumers were connected to a heat network from one of only five players [69,71]. These players are responsible for a third of all heat supplied to heat consumers and serve entire cities and regions in the Netherlands. In addition, housing corporations and homeowners’ associations each account for a quarter of the heat supply to heat consumers. The latter two typically supply heat via block heating and are relatively small-scale [69].

Heat networks may also be classified in ‘generations’. It may come as no surprise that newer heat networks are technologically more advanced than older networks. Newer generations of heat networks support increasingly lower water temperatures while still allowing for the release of heat. Most heat networks in use are third generation heat networks. Due to the lower water temperature, these heat networks can be fuelled by a greater variety of heat sources (not limited to fossil fuels) compared to older generations, thereby ensuring a more efficient heat use. The possibility to use a greater variety of heat sources opened the way to the use of biomass and waste as heat sources, sometimes even supplemented by solar and geothermal heat [72].

Fourth generation heat networks go a step further and are well-equipped to supply heat to modern, energy-efficient buildings with lower heat demands (due to better insulation, etc.). The lower water temperature (around 65 degrees Celsius) means that transport losses are significantly reduced. Technological developments and the possibility to integrate renewable heat sources, such as geothermal heat, into the heat network open the way for the use of smart energy systems. Fourth, and especially fifth, generation heat networks are not yet prevailing in the Netherlands [73].

### 3.2. Features of the Market

Older generation heat networks are plagued by considerable transport losses: nearly 10–15% of heat is lost during transport [74]. To mitigate this, heat networks in the Netherlands tend to be local and decentralized. Another feature shaping the market is that the location of a heat source cannot, in all instances, be chosen freely. Combined with the fact that most heat networks are prone to transport losses, significant limits are posed upon the location of heat networks [75].

Furthermore, in case the production of heat is linked to other processes (for example, in the case of the use of waste heat), the predictability and reliability of heat production are not straightforward. After all, the production of heat waste is dependent upon another process. In these cases, investing in heat production proves to be more complicated compared to investing in single production processes [75]. In addition, heat networks are closed systems, meaning that the water in the network is pumped around and does not leave the networks—only the heat is delivered to consumers. Therefore, it is generally more challenging to add parties to the loop as this may make the system more vulnerable to loss of heat, quality, etc. Lastly, because heat demand fluctuates, is seasonal and difficult to store, auxiliary heat sources have to be ready to deliver heat to the grid if demand outgrows supply [75].

As a result of these features, the heat market is comprised of local, natural monopolies. Most heat consumers have no alternative heat sources due to a lack of alternative connections. This situation is likely to remain because, as of 1 July 2018, no gas grid connection is provided for newly built houses in the Netherlands (Article 10(7)(a) and (b) of the Dutch Gas Act). Instead, new dwellings are connected to a heat network or are provided with a heat pump or other means of heating. In some cases, heat consumers wishing to terminate their heat supply contract are prevented by law from doing so (Article 3(c) of the Dutch Heat Act). This is the case when a heat supplier can prove that it is technically impossible to stop the supply of heat to that consumer or that termination would lead to a significant disadvantage to another heat consumer. This raises the question whether and to what extent heat consumers should be protected, and, if so, what this protection should entail [76].

### 3.3. Applicable Laws and Regulations

Dutch heat market legislation stems from before the energy transition. Consequently, technological changes instigated by the energy transition are generally not reflected in the applicable laws and regulations. This means that the envisioned role of heat networks in the energy transition and the resulting legal implications are potentially not supported by the regulatory system [77].

The heat market comprises of the production, transport/distribution and delivery of heat [68,75]. Players on the heat market are not subject to any unbundling requirements: both vertically integrated firms and non-integrated firms may be active, nor is there any requirement that public authorities, unlike energy networks, must own heat networks. Heat consumers are typically dependent upon vertically integrated suppliers who are in charge of network management, transport/distribution and delivery.

The majority of the applicable rules are included in the revised Dutch Heat Act, which entered into force on 1 July 2019. The revised Dutch Heat Act bridges the period until the ‘Dutch Heat Act 2.0’ is implemented, which is envisaged to be in force as of 1 January 2022. The legislative process will focus on three main themes: market organization, tariff regulation and sustainability [78,79].

The first version of the Dutch Heat Act first entered into force on 1 January 2014 and was preceded by a legislative process spanning approximately ten years. Until then and compared to the rules in place to protect other energy consumers, heat consumers were left in the cold, with an ex post application of competition law as their only solace. Regulation was desired in order to balance the situation in which electricity and gas users could both benefit from a liberalized market and enjoy (some) legal protection whereas heat consumers could and did not [80]. This lack of regulation of the heat market exposed certain ‘free market competition’ problems. It was, for example, feared that heat consumers could be charged exceedingly high prices or had to settle for unsatisfactory service from heat suppliers, without any specific remedies at hand [81]. In addition, such a more or less free

market set-up was difficult to reconcile with the importance of heat supply and the need for it to be available to all citizens. For example, without regulation, heat companies may lack the incentive to serve difficult-to-reach consumers. This could result in cherry picking whereby only the most profitable consumers would be served [82].

The Dutch Heat Act requires only ‘large-scale’ heat suppliers to be licensed. This partially explains the lack of precise information on the number of heat consumers. The Minister of Economic Affairs and Climate Policy (the “Minister”) grants a license to any (aspiring) heat supplier that can satisfactorily prove that (i) it has the required organizational, financial and technical qualities for the proper performance of its duties and (ii) it may reasonably be deemed capable of fulfilling the obligations contained in Chapter 2 of the Dutch Heat Act (Article 10 of the Dutch Heat Act).

Pursuant to Article 5 of the Dutch Heat Act, tariffs for the supply of heat are capped. The Authority for Consumers and Markets (ACM) is charged with setting a maximum tariff. ACM determines the maximum tariff annually, using a predetermined method of calculations based on the no-more-than-otherwise principle. On that basis, the maximum price is composed of two parts: (i) a usage-dependent part, expressed in euros per gigajoule and (ii) a usage-independent part, expressed in euros (Article 5(2) Dutch Heat Act). This price cap only applies to the supply of heat to heat consumers. Despite criticism on its functioning, the price cap imposed by ACM has been maintained [69,76]. The main concerns on the price cap in its current form relate to the fact that the no-more-than-otherwise principle prevents cost-based pricing in the heat market and to the awareness that this principle is unlikely to be future-proof in light of the increase in alternative ways of heating.

Every year, ACM recalculates the maximum tariff, which then applies until 1 January of the following year (Article 5(3) Dutch Heat Act). Once every two years, ACM collects, analyzes and processes information concerning the development of returns of heat suppliers. This is aimed at preventing excess profits made at the expense of heat consumers. ACM reports these findings to the Minister. In addition, the price for being connected to an existing heat network is capped at the price of a connection to the gas grid (Article 6 Dutch Heat Act).

With the energy transition leading to a decline in the use of gas, it will soon become untenable to use gas prices as a standard. To promote competition amongst different heating technologies with an aim at reversing or stalling climate change, the idea of gas price as the standard has to be abandoned [83]. A successful energy transition resulting in a sustainable energy system benefits from rapid developments in heating technologies and fair and actual competition amongst technologies. This is all the more so considering that the gas price has little to do with the costs of heat supplied via heat networks [84].

#### 4. Recent Developments—Main Economic and Legal Challenges in the Dutch Heat Market

In line with the energy transition stimulating new technologies, developments in the Dutch heat market are on the rise and show the need for a change in the organization of the Dutch heat market. These developments range from an increased interrelation between different energy markets and a call for innovation regarding the stimulation of decentralized heating projects. Several developments are discussed below.

##### 4.1. Move Away from Gas

Save for exceptional circumstances, newly built houses are no longer connected to a gas grid. The Dutch government further aims to have the use of natural gas phased out by 2050 [85]. Contributing to the realization of this development is the recent amendment to the Dutch Crisis and Recovery Act that gives municipalities the possibility to cut off existing households from the gas grid. District heating will cater for more households and play an important part in the Dutch plan to reduce carbon emissions.

This development exposes certain challenges that the current organization of the heat market insufficiently addresses. For example, by capping the maximum price for heat consumers to the price

of natural gas, the price for heat will depend on an ever-smaller group that derives its heating from a non-preferred energy carrier.

Furthermore, whereas gas and electricity consumers are free to switch suppliers, similar possibilities do not yet exist for heat consumers due to technical and regulatory barriers. This locks heat consumers into long-term contracts without providing them with alternative heat sourcing to switch to [75]. In light of the foregoing, the move away from gas also accentuates the importance of the question whether third-party access to heat networks should be encouraged. For one, non-discriminatory network access may improve the prospect of competition on the heat market. In addition, the question is whether unbundling could play an efficient role in removing the incentive for vertically integrated firms to discriminate against potential competitors seeking network access.

#### 4.2. Climate Neutrality of Heat Networks

In 2017, the PBL Netherlands Environmental Assessment Agency (PBL), the national institute for strategic policy analysis in the fields of the environment, nature and spatial planning, took the view that the most economical way of supplying around 60–70% of the national demand for low temperature heat would be through heat networks [86].

Climate neutrality and energy efficiency are also linked to the use of the best-placed heating solution. Existing heat networks are often supplied by one large, fossil-fired heat source or a limited number of heat sources from one owner [86]. A low carbon economy requires heat networks that are supplied by less-polluting or renewable sources. The generally smaller size of these heat sources means that heat networks may have to be supplied by different heat sources at the same time, possibly by different owners. To facilitate this, rules have to be in place for third-party access. In addition, a comprehensive set of rules has to be in place in order to stimulate the use of alternative heat sources for heating, such as geothermal heat [87].

The 4th and 5th generation heat networks allow for the supply of (energy efficient) buildings with space heating and warm water, while reducing losses in heat grids [88]. To enable the use of these new heat networks, many buildings and production processes must be made suitable for this type of heat supply, a costly process. PBL identified that, currently, investment risks are high and financial returns low because the scope for a price increase is limited, and there is an interdependence in actors required for success. To spur investments in climate-friendly energy projects, Invest-NL -was established in January 2020. This investment fund is financed with public funds and aims at higher-risk energy projects that currently do not receive sufficient investments from the market [89]. Risks involved with investing in new heat networks need to be mitigated by reliable regulation to also attract private investments.

#### 4.3. Prosumers

The term prosumer generally refers to consumers who generate (renewable) electricity for their own consumption, and who may store or sell self-generated electricity [90,91]. In EU regulation, generating and/or storing electricity is not the prosumer's primary commercial or professional activity.

Prosumers may play a part in attaining the climate neutrality of the heat market because they typically generate energy from renewable sources [92]. The often local character of a heat network may prove to be exceptionally compatible with small-scale prosumerism. In addition, prosumerism may respond to concerns expressed by way of the upcoming energy democracy and energy justice concepts in that it gives citizens a possibility to actively participate in the energy sector. Existing legislation does not support the role of prosumers in the Dutch heat market.

#### 4.4. Digitalization

Digitalization of the energy sector involves the application of digital technology to the production, transport, distribution and supply of energy. Smart energy meters, for example, enable consumers to monitor and manage their real-time energy use. Smart grids allow changes in supply and demand to be



managed real-time by energy suppliers. The electricity sector is already benefiting from digitalization by providing consumers and suppliers alike with valuable insights upon which they can act [93].

Digitalization efforts are also relevant for the heat market, especially in light of the 4th and 5th generation heat networks [72]. Increased digitalization may lead to many possibilities, each with their own challenges. The use of smart meters for example, triggers questions on ownership, data sharing and privacy. In addition, digitalization necessarily requires investments in digital technologies, which lay bare the need for a stable investment environment. For example, capped tariffs should take into account investments made in digitalization, as opposed to only the ‘traditional’ investments related to, for example, the network upkeep. Whereas digital technologies may provide more insights into demand and supply, there must be options to act upon these insights, for example, by switching to other energy sources or carriers (grid connection) and by regulating network access.

#### 4.5. Conclusion

It follows from the above that many developments in the Dutch heat market are interrelated and, together, will lead to substantial reforms on the heat market. This is all the more so in light of the increasing interdependence between different markets in the energy sector. Out-dated regulations governing the Dutch heat market in transition may stifle innovation and lead to a less-than-optimal regulatory environment, not only to the detriment of the heat market but to the energy sector as whole [94].

To allow the heat market to progress and contribute to a low-carbon economy, important decisions have to be made regarding the design of market regulation and supervision of the Dutch heat market. These decisions encompass, i.e., (i) unbundling, (ii) third-party access and (iii) regulation and supervision, taking into account the rights and obligations of prosumers and consumers. Each of these points contributes to opening up the heat market and allowing it to take up its role in the energy transition. To encourage adequate decision-making and soundly motivated decisions, the principles of good regulation ought to play a role in the weighing of the available options and their advantages and disadvantages. This may be done by way of the framework that the principles of good regulation offer: promoting independence, accountability mechanisms, transparency requirements, possibilities for participation, effectiveness and efficiency.

### 5. Assessment

The sector-specific concepts of energy justice and energy democracy, the principles of good regulation and the main recent developments have been set out above. The assessment in this section evaluates the three main challenges—unbundling, third-party access and supervision—in light of the framework provided by the principles of good regulation.

#### 5.1. Unbundling

The integrated model is predominant in the Netherlands; meaning that the production of heat, the ownership of the heat network and the supply of heat are all combined in one company [69].

Keeping in mind that most heat networks in the Netherlands are third generation, several studies have found that unbundling is not feasible for the existing heat networks [69,75,95]. The recommendation against unbundling holds true for all its forms: accounting, organizational, legal, and in terms of ownership [75]. In particular, technical limitations of most functional heat networks prevent unbundling from remedying the existence of natural monopolies. At the current stage of economic and technological development, unbundling would lead to disproportionate costs. These costs relate to the separation of the different levels of the chain, from production to delivery to heat consumers, without (as of yet) adding any value to heat consumers [69].



## Unbundling Assessed

In spite of the fact that unbundling is currently recommended against under the present economic and technical conditions, unbundling can bring significant benefits under the right circumstances. For example, unbundling takes away the incentive for vertically integrated firms to favor their own (up- and downstream) activities. Thereby taking away the incentive for dominant firms to abuse their position, ranging from margin squeeze to overcharging or providing suboptimal service to locked-in heat consumers. To some extent, unbundling may also take away cross-subsidization and prevent unfair competitive advantages to inefficient undertakings or parts of undertakings. Moreover, the development of technologically advanced heat networks is on the way and the relevance of heat markets is on the rise. This combination of factors calls for a future-proof organization of the Dutch heat market.

What is important to keep in mind is that the Dutch heat market consists of a large variety of heat networks. As has been explained, differences in heat networks range from type, size, ownership structure and heat source to the age of heat networks. In light of the many differences, it is advisable to have the possibility of unbundling requirements in place for newer generation heat networks where the advantages of unbundling could outweigh the costs. This would provide for the opportunity to prevent abuse of dominance issues by pre-empting possible abusive behaviors facilitated by vertical integration. This is a strong indication that customized regulatory solutions are called for as a one-size-fits-all approach would not be in line with the structure of the heat market.

Unbundled firms, especially when it concerns legal or ownership unbundling, can also bring benefits in the field of transparency. Cost transparency may be increased by making it mandatory for firms to split activities and isolate costs to keep them where these are incurred. This means that cross-subsidizing risks diminish or, at the very least, become visible. That may bring on an additional incentive for cost reduction and the promotion of efficiency, especially in the case of ownership unbundling where all firms active on the heat market must survive on their own merits.

Customized regulatory solutions regarding unbundling, i.e., having different degrees of unbundling requirements in place according to the type of heat network, also relate to the principles of effectiveness and efficiency and provide for a proportionate course of action. The imposition of unbundling requirements to older heat networks would not be efficient as has been concluded before [69,75]. However, not imposing unbundling requirements at all, as is currently the case, is likewise not effective as some heat networks benefit from unbundling. In turn, unbundling would benefit the energy transition as it would also allow for renewable resources to be added to existing networks. Hence, there is a very strong case to make for customized solutions within the framework of the organization of the Dutch heat market. Unbundling can spur the efficiency of firms, facilitate competition and stir innovation. In order to reach the most efficient and effective situation for each heat network, unbundling requirements could range from accounting, organizational, legal and ownership unbundling. The principles of effectiveness, efficiency and transparency can guide the choices to be made when the costs and benefits of different options are assessed.

### 5.2. Third-Party Access

The revised Dutch Heat Act provides for a light version of negotiated access. The act obliges network operators (and heat suppliers active on the network) to respond to requests from heat producers and consult with them on access to the network for the purpose of transporting heat. Both the network operator and the heat supplier have to disclose information to the requesting heat producer regarding, i.e., the available transmission capacity, heat demand and production capacity (Article 21 of the Dutch Heat Act).

Considering the technological limitations of most of the heat networks in the Dutch heat market, third-party access is still, but conceivably not for much longer, something for the future. This is mainly due to heat networks being closed loops. Older generations of heat networks distribute very hot water or steam and are, therefore, highly sensitive to change. Change in the form of adding extra parties

to the loop may alter the temperature of the water. As a consequence, third-party access may not be a proportionate and efficient solution because costs of implementing and enforcing it would not outweigh its benefits.

### Third-Party Access Assessed

Technology is advancing and the 4th and 5th generation district heating (and cooling) networks are up and coming [96]. Fifth generation heat networks distribute water at a close to ambient ground temperature. Transport losses are significantly limited and installation costs are lowered. Since the water temperature is relatively low, it may also become easier to add parties to the network.

With the principle of independence in mind, the Dutch Heat Act's provision on negotiated network access, with no dispute resolution mechanism in place, might better be replaced by non-discriminatory access rights. Enforceable access rights, aimed at network access on fair terms, protects parties seeking access to the network as it makes it difficult for the network owner to refuse to grant access on invalid grounds. At the same time, if third-party access is refused on allegedly invalid grounds, the party seeking access is in a better position to enforce its rights. Independence also means that the owner of the heat network is either independent from all the parties on the network (which would be the case for heat networks where ownership unbundling is required) or the owner is prevented from treating certain parties on the network more favorably than others. If third-party access rules are only aimed at the heat networks where third-party access is possible and the case-specific circumstances are taken into account, third-party access responds to the principles of effectiveness and efficiency. This is mainly so because it then acts as an incentive for incumbents to optimize their services. Should they not, any third party may try to fill the gap by gaining network access and offering better heat supply services.

In order to curb the dominant position of the network owner, who is in charge of granting third-parties access to the network, a fair access mechanism should be in place. It is likely that regulated third-party access increases market transparency to the benefit of heat consumers and other stakeholders. Parties seeking network access have to be given insight into the access costs and could compare access prices from different heat networks that qualify for third-party access regulation. While it is essential to keep in mind that the differences between types of heat networks mean that direct comparisons between access prices may not be drawn, a cost breakdown could still be helpful in assessing whether a fair price is levied. Regulation could indicate the composition of access prices by cost breakdown elements. This may also increase cost efficiencies.

Third-party access possibilities in regulation allow for flexibility and opportunities for the regulatory authority to step in when third-party access can benefit the heat network and heat market. For example, different categories of heat networks could be identified. Whether third-party access rights can then be given to parties would depend on the type of heat network and heat source. Such flexibility also allows for a less path-dependent regulatory approach and more technology neutral outcomes by way of allowing regulatory authorities to adapt to technological changes.

Prosumers should have the possibility, similar to the electricity sector, to be active on the wholesale heat markets via heat networks that can technically (and economically) support this. This will mostly apply to the future 4th and 5th generation heat networks. Third-party access rights specifically aimed at prosumers can facilitate this. Such rights are valuable from the perspective of the principle of participation, shaped by energy justice and energy democracy, as it provides heat consumers with a chance to be actively involved in and shape the heat market.

### 5.3. Supervision

ACM is the designated regulatory authority in charge of implementing and enforcing the Dutch Heat Act (Article 14 Dutch Heat Act). This means that ACM is in charge of setting the maximum heat price (Article 5 of the Dutch Heat Act). As explained, the maximum heat price is linked to the price of natural gas. Once every two year, ACM also monitors the development of the return rates in the heat supply market (Article 7 of the Dutch Heat Act). In addition, ACM is authorized to carry out

measurements at heat producers, heat suppliers and heat consumers (Article 16 of the Dutch Heat Act). Should ACM find that the Dutch Heat Act is not complied with, it may impose binding codes of conduct, periodic penalty payments and administrative fines (Articles 17 and 18 of the Dutch Heat Act).

The Minister is in charge of granting and withdrawing licenses to heat suppliers, which ACM does on behalf of the Minister [97]. The Minister is authorized to obtain all necessary information and intelligence needed for the application of the Dutch Heat Act and for drawing up the energy report as required by Article 13 of the Dutch Heat Act. This energy report is drawn up at least once every four years. In it, the Minister gives guidelines on the energy-related decisions that the government will have to take in so far as these (may) concern the reliability, sustainability, efficiency and environmentally sound functioning of the energy supply (Article 2(1) of the Dutch Electricity Act 1998).

### Supervision Assessed

If the organization of the heat market is overhauled to support a more holistic energy sector, supervision arrangements should be coordinated carefully to match the future of the heat market.

Customized solutions regarding unbundling and third-party access, as well as the modernization of the heat market, require supervision that stimulates the development of the heat market without ‘prescribing’ or favoring certain technological outcomes. This implies that ACM ought to be independent from market parties, as regulatory capture may result in favoring a certain technology over another, but also, to some extent, from political influence. This is already partially guaranteed because ACM employs specialists that are expected to have the best interests of the heat market at heart rather than short political gains. To maintain this, it is preferable that ACM keeps and strengthens its independent position to take specific decisions in an autonomous manner. Politicians should decide on the long-term goals, to which ACM in its capacity as the regulatory authority of the heat market should tend by decision-making on a day-to-day basis.

When it comes to discretionary powers, ACM is not currently equipped to impose and enforce different regulatory requirements for different heat networks as the Dutch Heat Act does not provide a basis for a customized regulatory regime [76]. Nevertheless, because of the different types of heat networks, it is important that the regulatory framework of the heat sector supports effective and proportionate regulation and encourages tailor-made solutions. Flexibility and room for tailor-made solutions are not only relevant for already active heat suppliers but also for the transition of areas from gas to heat networks [98]. The transition from gas to heat networks of neighborhoods and (parts of) municipalities has as its result that the role and powers of municipalities are most likely to be expanded. The consequences for the regulatory oversight performed by ACM are, therefore, somewhat uncertain. In deciding the role (if any) for municipalities, the principles of good regulation can provide guidance on a solution that caters for a future-proof heat market. For example, it could be the case that the municipalities oversee local heat networks, whereas ACM will be responsible for (larger scale) regional heat networks. In any case, similar considerations are relevant both for municipalities in a regulatory capacity and for ACM. Effective regulatory oversight requires ACM to have adequate powers to facilitate the integration of competitive clean heat carriers in the energy system. Having the possibility to impose unbundling and third-party access requirements in the heat sector, if required, based on a case-by-case assessment and fine-tuned depending on the type of network, is a step in the right direction. Discretionary powers allow ACM to regulate in a technologically neutral way and to tailor its regulatory action on a case-by-case basis. Such levels of discretionary powers provide for flexibility in ACM’s actions. Increased flexibility, on the other hand, raises questions on whether the current accountability mechanism will be sufficient to address any concerns stemming from an increase in flexibility on the side of ACM.

ACM is part of the ministry of Economic Affairs and Climate Policy and, as such, ‘inevitably’ renders account to the Minister on its general performance. In his/her turn, the Minister renders account to the Dutch government. Separately, ACM also publishes an annual report in which it reports its performance of the previous year. Whereas stakeholders have few possibilities to hold

ACM accountable on the basis of the annual report, it does serve a valuable function in terms of transparency. While ACM already largely acts in a transparent way, for example, by publishing its decisions and issuing guidelines, this needs to be maintained and possibly upgraded. A duty of transparency contributes to fairness in decision-making and provides stakeholders with the possibility to monitor ACM. This is an important element of accountability.

The accountability element can also be linked to the importance of stakeholder participation. With the transition towards a low carbon economy on the way, a broad support base is needed to reach decarbonization goals. Energy justice and energy democracy require strong participation possibilities that can shape the support given to the energy sector in transition. Heat consumers participation in the heat market can provide such support. This is evidenced by experiences in Denmark, where the energy transition takes place more rapidly than in the Netherlands, i.e., because of high levels of citizen involvement that advances the transition [99]. Germany, where energy democracy takes an important position in the energy transition, also benefits from acceleration in the energy transition due to citizen involvement [30]. As it is likely that most Dutch heat consumers will remain locked in for a relatively long time in natural monopolies facilitated by older generation heat networks (and the lack of alternatives), they could get involved with heat producers, suppliers and/or network owners (depending on whether they are vertically integrated). This involvement would be a form of substantive participation and can take various forms. For example, heat consumers could become ‘shareholders’ in already existing arrangements or set up a new communal heat network in which they are directly involved regarding ownership, decision-making, etc. This way, heat consumers have direct influence on their heat supply arrangement by way of decision-making and profit sharing, thereby, potentially increasing the chances that older generation heat networks are being made more sustainable. Benefits of citizen involvement may especially apply to newer generation heat networks, where sustainability can play a larger role right from the start by facilitating acting together, the connection of different grids in the energy sector, prosumerism, renewable energy sources, and the interlinking of various local energy-efficient ideas. Despite its promising benefits, consumer participation, as well as the role of prosumers, receives little attention in the Dutch heat regulation.

Throughout this study, it has been held that certain assumptions underlying the Dutch regulatory framework are outdated in light of the energy transition. This is especially true for the link between gas prices and heat delivered via heat networks. For a sustainable, low-carbon energy sector, energy solutions are better judged on their own merits. Energy sources and networks should be assessed individually and according to the circumstances—well-placed solutions differ and competition between different options should take place without seemingly taking one solution as the ‘standard’. ACM’s effectiveness and efficiency are dependent both on the tools ACM has at its disposal and on the regulation it has to enforce. Whilst it is true that efficient regulatory outcomes are difficult to measure, linking the heat price to the price of gas has already proven to be inefficient. Therefore, Dutch regulation should foresee in a different price control mechanism, for example by enforcing cost-based regulations by allocating appropriate subsidies, etc. In this light, it is interesting to note that a start has been made by looking into alternatives to the gas reference price [100] and by exploring the possibility to grant ACM additional powers so that it can gain insight in the balance between rates charged by heat suppliers and their underlying costs of heat supply [101].

#### 5.4. Possible Scenarios

Implementation of unbundling requirements, third-party access and flexible supervision require an overhaul of the Dutch heat market. Whereas it is uncertain what shape such an overhaul would take, especially in light of intentions to grant municipalities more powers on the heat market, it is noted that considerations on the regulatory oversight applicable to ACM are also relevant for municipalities if they are granted regulatory responsibilities. Table 1 outlines certain thoughts on what would happen when all, or only some, of the preferred main changes are put into effect. It should be noted that the options of unbundling and third-party access are only applied when a heat networks supports it and

circumstances call for it. This means that 1st, 2nd and 3rd generation heat networks will typically not benefit from third-party access and, to a lesser extent, from unbundling.

**Table 1.** Scenario analysis.

Un-Bundling	Third-Party Access	Flexible Supervision	Pros and Cons Analysis
X	X	X	In this scenario, the Dutch heat market would benefit maximally from the proposed changes. A holistic approach would be facilitated in which ACM can constantly respond to developments on the heat market. Consumers are better protected due to unbundling requirements and third-party access possibilities, whilst regulation provides ample citizen involvement possibilities. A practical disadvantage is the initial cost of reorganizing the regulatory framework of the heat market, but the transition towards flexible regulation and tailor-made solution should outweigh these costs in the long run especially if the share of the 4th and 5th generation heat networks, which could benefit from unbundling and third-party access, increases over time.
X	X		If only unbundling requirements and third-party access possibilities are provided for, heat consumers could still benefit from lower prices and/or better service. The unbundling requirements induce a level playing field in terms of competition, which is enhanced by the threat of potential competition entering the heat networks. A weak regulatory framework, however, may mitigate the advantages as the supervisory powers of ACM do not extend to adopt a flexible approach towards regulating the heat market. Consumer participation is not provided because regulation remains otherwise unchanged.
X			If only unbundling requirements are possible, transparency may increase substantially without leading to distinct advantages for consumers. Competition entering the grids is not a threat (the current light form of negotiated third-party access would be insufficient), and supervision is not adjusted to facilitate consumer involvement or tailor-made regulatory actions.
X		X	Unbundling and flexible regulation together may lead to better consumer protection and involvement even though there is no obligation to allow competitors on a grid. Despite such requirement, unbundling can prove beneficial as it increases transparency for consumers and ACM alike. With flexible regulatory powers, ACM can guarantee consumer protection. Whilst citizen involvement on existing grids may not be viable (no third-party access rights), other types of citizen involvement are more probable due to facilitating regulation and supervision.
	X	X	Third-party access possibilities without unbundling requirements considerably weaken the allure of third-party access. A level playing field is not guaranteed, meaning that vertically integrated companies may deter potential competition from entering a heat network. Flexible regulation and supervision remain attractive in so far as it plays a role in enforcing third-party access rules and may facilitate citizen involvement initiatives.
		X	Flexible regulation and supervision may benefit new energy projects and facilitate consumer participation, but the lack of unbundling and third-party access possibilities extend the status quo for current 3rd generation heat networks on which vertically integrated firms are active to the 4th and 5th generation heat networks. ACM would lack the important tool of imposing unbundling requirements and of allowing for more competition on heat networks, which could benefit from it. Regardless, the position of consumer may improve due to improved price-regulation and regulation that supports citizen involvement in the heat market.

## 6. Conclusions

While heat networks are gaining more importance in the Netherlands, so is the discussion regarding the appropriate market organization and adequate regulation of the heat market. This has led to significant scrutiny of the functioning of the market, with news headlines drawing the public's attention.

Technology as it stands for 3rd generation heat networks leaves little room for competition: vertically integrated firms are often local monopolies, with the Dutch Heat Act trying to protect consumer prices by using the average gas price as a price cap. Change is on the way however, and it is to be expected that the 4th and 5th generation heat networks will be installed in the near future.

These networks bring technological advancement and more leeway for competition and consumer choice. However, regulation of the heat market in its present form does little to pave the way for advancements to materialize.

The assessment shows that there remains a lot to gain in terms of less technologically path-dependent regulation, flexible regulation and supervision as well as citizen participation. The lack of flexibility could play up if unbundling and third-party access is not providing when the 4th and 5th generation heat networks become in use as these types of networks could technologically be ready for competition on the heat market. Whereas the electricity market testifies that unbundling and third-party access have many advantages, it would be constructive to benefit from similar advantages in the heat market. A larger need for flexibility is then justified because of the difference between the types of heat networks. It would allow ACM to assess, on a case-by-case basis, whether unbundling and/or third-party access would be beneficial and preferable on specific heat networks and to specify regulatory requirements.

Increased citizen participation, on the other hand, is important in light of achieving energy justice and energy democracy, which are energy specific concepts that are influencing how we interpret and apply the principles of good regulation. Both are based on the awareness that the energy transition is a matter for all. Since it is likely that most heat consumers remain locked in for a relatively long time in natural monopolies facilitated by older generation heat networks and the lack of alternative heating, substantive citizen participation could yield positive results regarding community engagement in heat network management and heat supply.

At the beginning of this study the question was asked whether the principles of good market regulation can play a role in regulating the energy transition, in particular by dealing with challenges of regulating the Dutch heat market, and if so, how? This question can be answered in the affirmative. Considering that the Dutch heat market has still a lot to gain in terms of flexible regulation and supervision as well as participation, the principles of good market regulation and supervision have a role to play in modernizing the regulation of the Dutch heat market. In terms of 'how', it is noted that the principles can provide a framework within which advantages and disadvantages of regulatory choices can be weighed and the use of customized solutions can be substantiated. The principles can also be applied to ensure the accountability of the independent authority vis-à-vis the Minister and the citizens. Regulation will have to be up to date with the energy transition that relies on and stimulates new forms of energy generated with sustainable sources and new ways of storing energy. This means that a more holistic regulatory approach is needed.

As a consequence, the principles of good regulation can provide a framework for energy markets that facilitate a convergence in regulation by addressing the needs of the energy transition, in particular the need for interlinking energy markets and increased citizen involvement and the avoidance of technological path-dependency. The validity of the findings in this study is strengthened by the developments taking place in the electricity sector. Here, the principles of good regulation can be identified in terms of, inter alia, unbundling measures imposed on market parties, the establishment of national independent regulatory authorities and the recognition of the position of prosumers. It facilitates a catch-up in terms of the energy transition in the electricity market. However, it should be noted that the principles of good regulation only offer guidance and not black-and-white solutions. Since the energy sector is in a crucial phase, the role of the principles of good regulation in guiding the energy transition deserves consideration: they can provide a relevant framework for scenario-analyses before choices are made. It is crucial to further explore the development of the principles of good regulation in the energy sector, especially in light of energy justice and energy democracy that have a growing influence on them. Opportunely, getting one step closer to a holistic approach of regulating the energy sector is possible when it comes to the Dutch heat market. The principles of good regulation can be taken into account in the heat market as change is on the way for the regulation of the Dutch heat market. The Dutch Heat Act 2.0 promises to significantly overhaul the market design. The Minister indicated that heat prices will no longer be connected to gas prices and the role of municipalities will



become the centre of gravity in its envisaged market design [79]. If the Minister's plans are included in the new act, municipalities will receive more competences in the heat sector, such as identifying 'heat plots' where heat networks are installed and appointing heat suppliers. The principles of good regulation can also play a role in deciding how to design the role of municipalities in the heat market. The above assessment illustrates that decision-making on, inter alia, unbundling, third-party access and supervision is also relevant for a future-proof heat market. These are factors that will have to be taken into account by the responsible municipalities. To guide the decision-making, both substantially and in terms of the procedure, of the regulators (in the broadest sense of the word: from municipality to ACM), energy democracy, energy justice and the principles of good regulation can provide the handle and tools to attain the appropriate solutions for the heat market and the energy sector as a whole.

The development of the Dutch Heat Act 2.0 thus provides for the perfect opportunity to allow notions like flexibility and participation to enter the Dutch regulatory set-up of the heat market to ensure it is ready for the future and its role in the energy transition.

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